Iguacel, I., Fernández-Alvira, J. M., Bammann, K., Chadjigeorgiou, C., De Henauw, S., Heidinger-Felső, R., Lissner, L., Michels, N., Page, A., Reisch, L. A., Russo, P., Sprengeler, O., Veidebaum, T., Börnhorst, C., Moreno, L. A. (2017). Social vulnerability as a predictor of physical activity and screen time in European children. *International Journal of Public Health*. https://doi.org/10.1007/s00038-017-1048-4

Peer reviewed version

Link to published version (if available):
10.1007/s00038-017-1048-4

INTERNATIONAL JOURNAL OF PUBLIC HEALTH.

Social vulnerability as a predictor of physical activity and screen time in European children

SUPPLEMENTARY MATERIAL

Table S1. Description of the study population at T1, stratified by subjectively-measured PA (divided into <1 hour of reported PA and >=1 of reported PA), ST (divided into <2 hours of ST and >=2 of ST) and belonging to a Sport Club (yes or no). Study population: children from 8 European countries aged 4.0-11.9 years examined from September 2009-June 2010.

	T1						
	N (%)	Reported PA[a]		ST[b]		Sports club[c]	
		<1 h	≥1 h	>2 h	≤ 2 h	NO	YES
Total	8482 (100%)	%	%	%	%	%	%
Age groups							
4 to < 6 years	3774 (44.5)	10.7	89.3	67.9	32.1	43.2	56.8
6 to < 12 years	4708 (55.5)	10.2	89.8	52.2	47.8	31.2	68.8
Gender of the child							
Male	4314 (50.9)	10.5	89.5	57.6	42.4	36.4	63.6
Female	4168 (49.1)	10.4	89.6	60.8	39.2	36.7	63.3
Country							
Italy	1255 (14.8)	15.1	84.9	52.7	47.3	46.7	53.3
Estonia	1146 (13.5)	7.9	92.1	45.0	55.0	25.6	74.4
Cyprus	891 (10.5)	12.8	87.2	50.6	49.4	46.0	54.0
Belgium	1038 (12.2)	20.0	80.0	65.0	35.0	30.8	69.2
Sweden	1289 (15.2)	4.2	95.8	54.7	45.3	27.4	72.6
Germany	893 (10.5)	7.6	92.4	74.4	25.6	24.2	75.8
Hungary	925 (10.9)	9.3	90.7	63.4	36.6	52.6	47.4
Spain	1045 (12.3)	7.3	92.7	72.8	27.2	41.5	58.5
BMI categories							
Thiness	967 (11.4)	10.8	89.2	75.8	24.2	41.1	59.0
Normal	5977 (70.5)	10.0	90.0	72.3	27.7	35.4	64.6
Overweight	997 (11.8)	10.3	89.7	65.6	34.4	35.9	64.1
Obese	541 (6.4)	14.8	85.2	62.3	37.7	42.0	58.0
Social network[d]							
Missing	84 (1.0)	15.5	84.5	61.9	38.1	41.7	58.3
Minimal	761 (9.0)	11.2	88.8	58.0	42.0	44.4	55.6
Strong	7637 (90.0)	10.3	89.7	59.3	40.7	35.7	64.3
Family structure							
Missing	60 (0.7)	8.3	91.7	38.3	61.7	36.7	63.3
Non-traditional	1562 (18.4)	11.8	88.2	47.2	52.8	43.1	56.9
Traditional	6860 (80.9)	10.1	89.9	39.4	60.6	35.0	65.0
Migrant status							
Missing	52 (0.6)	11.5	88.5	75.0	25.0	36.5	63.5
Migrant origin	1083 (12.8)	11.4	88.6	56.0	44.0	41.3	58.7
Native	7437 (86.6)	10.3	89.7	59.5	40.5	35.8	64.2
Employment status							
Missing	86 (1.0)	7.0	93.0	55.8	44.2	53.5	46.5
Unemployed	404 (4.8)	9.7	90.3	56.2	43.8	53.0	47.0
Employed	7992 (94.2)	10.5	89.5	59.4	40.6	35.5	64.5
Parental Education							
Missing	45 (0.5)	17.8	82.2	77.8	22.2	44.4	55.6
Low	528 (6.2)	9.1	90.9	63.1	36.9	54.7	45.3
Medium	4128 (48.7)	10	90.0	66.6	33.5	39.0	61.0
High	3781 (44.6)	11.1	88.9	77.5	22.5	31.2	68.8
Income							
Missing	488 (5.8)	12.5	87.5	75.4	24.6	36.3	63.7
Low	2583 (30.6)	12.0	88.0	66.2	33.8	48.2	51.8
Medium	2343 (27.6)	10.2	89.8	73.8	26.2	33.8	66.2
High	3068 (36.2)	9.0	91.0	72.9	27.1	28.9	71.1

Parental occupation							
Missing	221 (2.6)	8.6	91.4	70.1	29.9	49.3	50.7
Working class	2533 (29.8)	10.6	89.4	65.1	34.9	46.7	53.3
Intermediate	3143 (37.1)	11.2	88.8	73.3	26.7	35.3	64.7
Salariat	2585 (30.5)	9.6	90.4	74.9	25.1	27.0	73.0

Abbreviations: T1, follow-up; ST, Screen Time; h, hour(s).

[a] Reported PA: sum of hours that children spent playing outdoors (weekdays and weekend days) and weekly participation in sport club activities.

[b] Screen Time: total number of hours usually spent watching TV, videos or DVD and playing on the computer or games console.

[c] Sport club membership.

[d] Social network was assessed with the question how many persons they could rely on in case of need including their family: minimal (0-1 person) and strong (>2 persons).

Table S2. Longitudinal associations between social vulnerability indicators and the three reported outcomes (subjectively-measured via questionnaires) for the adjusted models. Results from the logistic mixed-effects models: odds ratios (OR), 99% confidence intervals (CI) and p-values are shown.

Study population: children from 8 European countries aged 4.0-11.9 years examined from September 2009-June 2010.

	Outcome at T1 [a,b]								
	Reported PA[c]			**ST [d]**			**Sports club member [e]**		
	OR	**99% CI**	**P-value**	**OR**	**99% CI**	**P-value**	**OR**	**99% CI**	**P-value**
Social network [f]									
Missing	0.99	0.43-2.30	0.987	0.92	0.54-1.56	0.758	1.00	0.53-1.90	0.988
Minimal	0.99	0.72-1.40	0.929	1.04	0.87-1.25	0.595	1.23	0.98-1.54	0.020
Strong	1.00			1.00			1.00		
Family structure									
Missing	0.66	0.16-2.04	0.576	0.74	0.34-1.61	0.325	0.88	0.41-1.89	0.673
Non-traditional	1.07	0.84-1.36	0.497	1.08	0.92-1.28	0.228	1.28	1.08-1.52	**<0.001**
Traditional	1.00			1.00			1.00		
Migrant status									
Missing	1.06	0.31-3.60	0.883	0.42	0.28-1.20	0.147	0.67	0.34-1.31	0.242
Migrant origin	1.25	0.92-1.64	0.074	1.07	0.82-1.12	0.656	1.09	0.94-1.27	0.242
Native	1.00			1.00			1.00		
Employment status									
Missing	0.57	0.18-1.79	0.207	1.05	0.63-1.72	0.848	1.43	0.75-2.70	0.139
Unemployed	0.87	0.55-1.40	0.461	1.17	0.93-1.49	0.174	1.70	1.26-2.30	**<0.001**
Employed	1.00			1.00			1.00		

Abbreviations: T1, follow-up; PA, Physical Activity; ST, Screen Time.

Bold indicates statistical significance.

[a] Models at T1 were adjusted for baseline age, gender, baseline classical SES indicators (education, income and occupation) and z-score of BMI by Cole & Lobstein (Cole and Lobstein, 2012), study region (intervention v. control) and baseline outcomes (reported PA, ST and sport club membership at T0, respectively).

[b] All models include random effects (school, country) to account for the study design.

[c] Reported PA: sum of hours that children spent playing outdoors (weekdays and weekend days) and weekly participation in sport club activities. Reference: Reported PA≥1 hour.

[d] Screen Time: total number of hours usually spent watching TV, videos or DVD and playing on the computer or games console. Reference: ST≤2 hours.

[e] Sport club membership. Reference: yes

[f] Social network was assessed with the question how many persons they could rely on in case of need including their family: minimal (0-1 person) and strong (>2 persons).

Table S3. Association between the accumulation of vulnerabilities at T0 and the three reported outcomes (subjectively-measured via questionnaires) at T0 for the adjusted models Results from the logistic mixed-effects models: odds ratios (OR), 99% confidence intervals (CI) and p-values are shown. Study population: children from 8 European countries aged 2-9.9 years examined from September 2009-June 2010.

	ACCUMULATION OF VULNERABILITY AT T0								
	REPORTED PA AT T0			ST AT T0			SPORTS CLUB MEMBERSHIP AT T0		
	OR	**99% CI**	**p-value**	**OR**	**99% CI**	**p-value**	**OR**	**99% CI**	**p-value**
Number of vulnerabilities[b]									
Missing (1289)	0.99	1.02-1.62	**0.005**	1.25	1.03-1.51	**0.003**	1.59	0.56-1.27	**<0.001**
3-6 vulnerabilities (1272)	1.15	0.89-1.50	0.147	2.00	1.66-2.42	**<0.001**	3.70	3.01-4.54	**<0.001**
2 vulnerabilities (2150)	0.98	0.79-1.22	0.834	1.45	1.24-1.70	**<0.001**	1.87	1.59-2.20	**<0.001**
1 vulnerability (3412)	0.97	0.80-1.17	0.680	1.19	0.98-1.28	0.034	1.37	1.20-1.56	**<0.001**
Non vulnerable (5768)	1.00			1.00			1.00		

Statistically significant results are shown in bold font.

Abbreviations: T0, baseline; PA, Physical Activity; ST, Screen Time.

[a] Models at T0 Basic models were adjusted for baseline age, gender and z-score of BMI by Cole & Lobstein (Cole and Lobstein 2012).

[b] A total vulnerability score was calculated by adding up the scores (1 vs 0) of the six vulnerability indicators (minimal social network, non-traditional family, migrant background, unemployed, low-income and low-education). Total vulnerability score ranges from 0 (the child has none of the six vulnerability indicators) to six (the child has all six vulnerability indicators).

Table S4. Association between the accumulation of vulnerabilities at T0 and MVPA (objectively-measured with accelerometers) at baseline for the adjusted models. Results from the logistic mixed-effects model: odds ratios (OR) and 99% confidence intervals (CI) are shown. Study population: children from 8 European countries aged 2-9.9 years examined from September 2009-June 2010.

	MVPA AT T0[a]		
	OR	**99% CI**	**p-value**
Number of vulnerabilities[b]			
Missing (750)	1.12	0.81-1.57	0.372
3-6 vulnerabilities (491)	0.96	0.66-1.40	0.763
2 vulnerabilities (846)	1.04	0.77-1.41	0.752
1 vulnerability (1396)	1.06	0.82-1.36	0.550
Non vulnerable (2409)	1.00		

Statistically significant results are shown in bold font.

Abbreviations: T0, baseline; MVPA, Moderate-to-Vigorous Physical Activity.

[a] Models at T0 Basic models were adjusted for season, baseline age, gender and z-score of BMI by Cole & Lobstein (Cole and Lobstein 2012).

[b] A total vulnerability score was calculated by adding up the scores (1 vs 0) of the six vulnerability indicators (minimal social network, non-traditional family, migrant background, unemployed, low-income and low-education). Total vulnerability score ranges from 0 (the child has none of the six vulnerability indicators) to six (the child has all six vulnerability indicators).

Table S5. Cross-sectional associations between social vulnerability indicators and the three reported outcomes (subjectively-measured via questionnaires) and MVPA (objectively-measured with accelerometers) at baseline for the basic adjusted models[a].

Results from the logistic mixed-effects models: odds ratios (OR), 99% confidence intervals (CI) and p-values are shown. Study population: children from 8 European countries aged 2.0-9.9 years examined from September 2009-June 2010.

	Outcome at T0 [a,b]											
	Reported PA[d]			**ST [e]**			**Sports club member [f]**			**MVPA**		
	OR	**99% CI**	**p-value**	**OR**	**99% CI**	**p-value**	**OR**	**99% CI**	**p-value**	**OR**	**99% CI**	**p-value**
Social network [g]												
Missing	1.65	1.13-2.40	**0.009**	1.01	0.64-1.60	0.955	1.72	1.07-2.75	**0.003**	1.40	0.68-2.87	0.234
Minimal	1.30	1.11-1.53	**0.002**	1.13	0.96-1.33	0.048	1.38	1.17-1.63	**0.001**	1.04	0.70-1.53	0.805
Strong	1.00			1.00			1.00			1.00		
Family structure												
Missing	1.47	0.77-2.80	0.130	1.23	0.71-2.12	0.326	1.14	0.66-1.97	0.527	1.68	0.74-3.77	0.101
Non-traditional	0.99	0.84-1.17	0.872	1.12	0.99-1.27	0.018	1.37	1.21-1.55	**<0.001**	0.99	0.72-1.35	0.923
Traditional	1.00			1.00			1.00			1.00		
Migrant status												
Missing	1.06	0.48-2.32	0.850	0.73	0.40-1.47	0.243	1.08	0.57-2.05	0.748	1.06	0.31-3.60	0.883
Migrant origin	1.02	0.83-1.25	0.818	1.43	1.23-1.65	**<0.001**	1.72	1.48-1.99	**<0.001**	1.25	0.92-1.64	0.074
Native	1.00			1.00			1.00			1.00		
Employment status												
Missing	1.29	0.74-2.23	0.234	1.35	0.89-2.05	0.066	1.30	0.83-2.02	0.132	1.32	0.76-2.29	0.193
Unemployed	1.20	0.89-1.62	0.107	1.57	1.27-1.94	**<0.001**	1.79	1.43-2.25	**<0.001**	0.99	0.67-1.47	0.956
Employed				1.00			1.00			1.00		

Bold indicates statistical significance.

Abbreviations: T0, baseline; PA, Physical Activity; ST, Screen Time; MVPA, Moderate-to-Vigorous Physical Activity.

[a] Basic adjusted models at T0 were adjusted for baseline age, gender, z-score of BMI by Cole & Lobstein (Cole and Lobstein, 2012) and additionally adjusted for season for the MVPA model.

[b] All models include random effects (school, country) to account for the study design.

[d] Reported PA: sum of hours that children spent playing outdoors (weekdays and weekend days) and weekly participation in sport club activities. Reference: Reported PA≥1 h

[e] Screen Time: total number of hours usually spent watching TV, videos or DVD and playing on the computer or games console. Reference: ST≤2 hours

[f] Sport club membership. Reference: yes

[g] Social network was assessed with the question how many persons they could rely on in case of need including their family: minimal (0-1 person) and strong (>2 persons).